LOTUS PART
APPROVAL PROCESS

Approval:

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Statement of Confidentiality

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Important Note:

This Lotus Part Approval Process supersedes the APQP Status Reporting Guidelines which is now obsolete and should not be used for suppliers to Lotus Cars Limited.
## Table of Contents

<table>
<thead>
<tr>
<th>Manual Section</th>
<th>Activity Ref</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>Copyright Notice</td>
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<tr>
<td></td>
<td></td>
<td>Table of Contents</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Revision Record</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Standard Forms</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Introduction</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Supplier Visit Activities</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Supplier Status Reporting</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>Quality History Review</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>Feasibility Review</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
<td>Design FMEA</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
<td>Process FMEA</td>
</tr>
<tr>
<td>8</td>
<td>5</td>
<td>Part Quality Requirements (PQR)</td>
</tr>
<tr>
<td>9</td>
<td>6</td>
<td>Tooling and Facilities</td>
</tr>
<tr>
<td>10</td>
<td>7</td>
<td>Process Control Chart (PCC)</td>
</tr>
<tr>
<td>11</td>
<td>8</td>
<td>Training Records</td>
</tr>
<tr>
<td>12</td>
<td>9</td>
<td>Checking Fixtures</td>
</tr>
<tr>
<td>13</td>
<td>10</td>
<td>Part Submission Sheet (PSS)</td>
</tr>
<tr>
<td>14</td>
<td>11</td>
<td>Sub-Supplier Approvals</td>
</tr>
<tr>
<td>15</td>
<td>12</td>
<td>Run at Rate</td>
</tr>
<tr>
<td>16</td>
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</tr>
<tr>
<td>17</td>
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</tr>
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<td>18</td>
<td></td>
<td>Glossary</td>
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<td>Details of Change</td>
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</tr>
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<td></td>
</tr>
<tr>
<td>A4-A-6148.2.3</td>
<td>Supplier Visit Agenda: Visit Three</td>
<td></td>
</tr>
<tr>
<td>A4-A-6148.2.4</td>
<td>Supplier Visit Agenda: Visit Four</td>
<td></td>
</tr>
<tr>
<td>A4-A-6148.3.1</td>
<td>LPAP Activity Plan</td>
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</tr>
<tr>
<td>A4-A-6148.3.2</td>
<td>LPAP Monthly Status Report</td>
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</tr>
<tr>
<td>A4-A-6148.4.1</td>
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<td>A4-A-6148.4.2</td>
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</tr>
<tr>
<td>A4-A-6148.7.1</td>
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<td></td>
</tr>
<tr>
<td>A4-A-6148.8.1</td>
<td>PQR (Part Quality Requirements)</td>
<td></td>
</tr>
<tr>
<td>A4-A-6148.8.2</td>
<td>PQR-C (Part Quality Requirements Change Request)</td>
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</tr>
<tr>
<td>A4-A-6148.9.1</td>
<td>Tooling and Facilities Buy Off</td>
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<td></td>
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<tr>
<td>A4-A-6148.11.1</td>
<td>Training Matrix</td>
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<td>A4-A-6148.12.1</td>
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</tr>
<tr>
<td>A4-A-6148.13.1</td>
<td>Part Submission Sheet</td>
<td></td>
</tr>
<tr>
<td>A4-A-6148.13.2</td>
<td>Part Submissions Problem Follow Sheet</td>
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</tr>
<tr>
<td>A4-A-6148.14.1</td>
<td>Sub-Supplier Approval Warrant</td>
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<td>A4-A-6148.15.1</td>
<td>Run at Rate Sign Off</td>
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1.1 Purpose

The Lotus Parts Approval Process has been developed to provide a simple and effective focused activity for developing parts and processes within the supply chain that can consistently deliver the requirements of Lotus Cars Limited at serial production volumes.

Key objectives of this process are:

- Promote clear and open communication between Lotus Cars Limited and its suppliers
- Drive early identification and robust resolution of problems
- Ensure a plan is in place and agreed to deliver a smooth launch of new parts using a standardised reporting and project management toolset
- Detail all activities required to demonstrate that the supplier can manufacture parts to agreed quality requirements at production volumes

The Lotus Part Approval Process applies to all suppliers of bulk materials and production parts / assemblies to Lotus Cars Limited. The specific activities required for each supplied part shall be agreed between the supplier and Supplier Quality Assurance during the planning phase.
1.2 Submission Levels

In terms of submission data to support evidence of activity completion Lotus Cars Limited operates different submission levels as follows:

<table>
<thead>
<tr>
<th>Category A</th>
<th>Lotus certification</th>
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<tr>
<td>Supplier must submit all of the LPAP documentation for full review</td>
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<table>
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<th>Category B</th>
<th>Self certification</th>
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<td>Final Part Approval, ELV/RRR Data Recording Sheet, Part Quality Requirements, Part Submission Sheets, Process Capacity Sheets and Appearance Approval Report (where appropriate) are required for submission</td>
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<th>Category X</th>
<th>Supplier uses alternative to LPAP</th>
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<td>Supplier may use an alternative approval process if agreed in advance with Supplier Quality Assurance. Final Part Approval, ELV/RRR Data Recording Sheet, Part Quality Requirements and Appearance Approval Report (where appropriate) are required for submission</td>
<td></td>
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</table>

Suppliers will be advised by Supplier Quality Assurance which submission category they fall into based on part technology, complexity and previous quality performance.

*Important Note*

*Lotus Cars Limited reserves the right to request copies of any documentation / records produced in line with this manual or to visit the supplier to view evidence of completion and continued adherence at any time.*
1.3 Activity Timing

The diagram below illustrates the generic timing of the 14 LPAP activities aligned with the Lotus Product Development System (LPDS) milestones for new models:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Start</th>
<th>Finish</th>
<th>Lotus Lead</th>
</tr>
</thead>
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<td>Planning Phase</td>
<td>CI</td>
<td>CA</td>
<td>SQA</td>
</tr>
<tr>
<td>Supplier Visits</td>
<td>CD</td>
<td>SOP</td>
<td>SQA</td>
</tr>
<tr>
<td>LPAP Status Reporting</td>
<td>CA</td>
<td>SOP</td>
<td>SQA</td>
</tr>
<tr>
<td>Quality History Review</td>
<td>CD</td>
<td>FA</td>
<td>NPQ</td>
</tr>
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<td>Feasibility Review</td>
<td>CD</td>
<td>FA</td>
<td>NPQ</td>
</tr>
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<td>FA</td>
<td>NPQ</td>
</tr>
<tr>
<td>Process FMEA</td>
<td>CA</td>
<td>PPA</td>
<td>SQA</td>
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<tr>
<td>Part Quality Requirements</td>
<td>CA</td>
<td>PPA</td>
<td>NPQ</td>
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<tr>
<td>Tooling &amp; Facilities</td>
<td>CA</td>
<td>SOP</td>
<td>SQA</td>
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<td>Process Control Chart</td>
<td>FA</td>
<td>PA</td>
<td>SQA</td>
</tr>
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<td>Training Records</td>
<td>FA</td>
<td>PA</td>
<td>SQA</td>
</tr>
<tr>
<td>Checking Fixtures</td>
<td>FA</td>
<td>PA</td>
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<td>Part Submission Sheet</td>
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<tr>
<td>Final Part Approval</td>
<td>PA</td>
<td>LA</td>
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**Fig 1.1 LPAP Activity Timeline**

The specific timings of activities will be agreed at the planning phase with Supplier Quality Assurance and documented on the supplier specific LPAP Activity Plan (A4-A-6148.3.1).
Lotus Part Approval Process
Supplier Visit Activities

2.1 Purpose

The supplier visit activities are designed to check the overall readiness for start of production (SOP) and confirm problems identified have agreed actions plans to resolve.

2.2 Forms Used

A4-A-6148.2.1 Supplier Visit Agenda: Visit One
A4-A-6148.2.2 Supplier Visit Agenda: Visit Two
A4-A-6148.2.3 Supplier Visit Agenda: Visit Three
A4-A-6148.2.4 Supplier Visit Agenda: Visit Four

2.3 Roles and Responsibilities

Supplier

- Agree quantity of visits and timing
- Provide suitable facility and resources to support the meetings
- Ensure the appropriate team members attend the visits to cover all agenda items

Supplier Quality Assurance *(Lotus Internal Owner)*

- Agree timing with the supplier that meets the project milestone timing
- Ensure visit agenda is agreed with all parties in advance of the meeting
- Prepare and distribute Visit Report after each visit

New Product Quality

- Support visits where required

Purchasing

- Support visits where required
Engineering

- Support visits where required

2.4 Activity Details

Supplier visits will typically take one day to complete and are based upon standardised agendas for each visit. A minimum of 4 visits will normally be conducted based on the following generic requirements:

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Supplier Visit One

The aim of the first visit is to review and confirm the up-front planning and problem prevention tools have been completed.

Supplier Visit Two

The aim of the second visit is to review the tooling and process preparation in readiness for supplying prototype parts.
Supplier Visit Three

The aim of the third visit is to review the initial off tool parts and process controls in readiness for supplying pre-production parts.

Supplier Visit Four

The aim of the fourth and final visit is to sign off the process and parts in terms of achievement of requirements and capacity for supplying production parts.
3.1 Purpose

This section details the standardised documents used to report status of the parts maturation and production readiness of the supplier.

3.2 Forms Used

A4-A-6148.3.1 LPAP Activity Plan
A4-A-6148.3.2 LPAP Monthly Status Report

3.3 Roles and Responsibilities

Supplier

- Write and submit LPAP Activity Plan within 4 weeks of order receipt
- Provide LPAP Status Report monthly until part approval achieved

Supplier Quality Assurance (Lotus Internal Owner)

- Agree LPAP Activity Plan and ensure content meets project requirements
- Review LPAP Status Report and escalate issues as appropriate

3.4 Activity Detail

LPAP Activity Plan (A4-A-6148.3.1)

This is the timing plan for all parts supplied for the project against the project key milestones and includes key requirements as follows:

- Tooling Design, Manufacture and Development
- Process development
- Pre-production parts manufacturing and delivery timing
Lotus Part Approval Process
Supplier Status Reporting

The Activity Plan should be submitted to Lotus Cars Limited within 4 weeks of receipt of the order unless an alternative has been agreed in advance with Supplier Quality Assurance. Once the Activity Plan has been agreed the status to the plan is reported via back spikes (behind plan) and forward spikes (ahead of plan) as part of the LPAP Status Report

LPAP Status Report (A4-A-6148.3.2)

Submitted monthly or as previously agreed by Supplier Quality Assurance. This report shows status against the LPAP submission requirements previously agreed.
4.1 Purpose

To review previous part issues and avoid repeating known failure modes.

4.2 Forms Used

A4-A-6148.4.1 Quality History Record
A4-A-6148.4.2 Quality History Tracker

4.3 Roles and Responsibilities

Supplier

- Generate and maintain Quality History Records as appropriate
- Maintain a Quality History tracker for all components
- Ensure all Quality History issues are understood and acted upon

New Product Quality (Lotus Internal Owner)

- Generate and maintain Quality History Records
- Follow the standard outlined in this manual
- Maintain a Quality History tracker for all components
- Ensure all Quality History issues are understood and acted upon

4.4 Activity Detail

In order to be proactive and avoid repeating previous failure modes, a detailed Quality History Review will be carried out. All previous failure mode should be understood and addressed. Issues identified will be fed into the production preparation process as early as possible in order to have the maximum positive affect. The Quality History Review should be used to capture things gone right (TGR) as well as things gone wrong (TGW).
Outputs Required

There are 2 outputs required for Quality History activities:

1. Quality History Tracker – this document lists the Quality History issues that have been considered and the actions required.

2. Quality History Records – these documents are raised for each individual issue found previously that will be reviewed during the design and process planning stages.

Raising QHR Issues

- A QHR issue may be raised by anyone.
- Quality History issues can be raised on any aspect of design or any element of the manufacturing or supply chain process.
- A Quality History issue can be raised at any time either through the development phases or post SOP.
- Once SOP is reached and all outstanding issues have been resolved all issues found during the maturation phase should be raised as Quality History Records to be used as inputs for future projects.

Note: Quality History issues must detail the root cause of the issue - not the symptom!

Follow-up for Quality History Review

Where the Quality History Review drives actions these are documented on the Quality History Tracker with action, owner and date required recorded. This document is then reviewed at future LPAP supplier visits to ensure all actions are completed and previous concerns are not repeated.
Processes for raising a QHR issue

Fig: 4.1 Raising a Quality History Record / Issue
Processes for reviewing a QHR issue

**Fig 4.2: Reviewing a Quality History**
5.1 Purpose

To highlight and resolve any potential issues with the manufacture or supply of the component prior to release of the final production drawings, tooling or process.

5.2 Forms Used

A4-A-6148.5.1 Team Feasibility Checklist

5.3 Roles and Responsibilities

Supplier

- Complete all internal reviews before the review meeting with Lotus
- Complete all agreed actions
- Sign off completed feasibility checklist

New Product Quality (Lotus Internal Owner)

- Ensure all internal checks with Engineering are completed before the review meeting with the Supplier
- Ensure that any requested changes are agreed by all parties
- Ensure action items raised from the review are completed

5.4 Activity Detail

The Feasibility Review should be conducted around drawings / engineering concepts or CAD models for all newly designed / tooled parts or parts undergoing significant change.
Engineering Data Review

Both parties should check the available engineering data in advance of the formal review meeting. This review shall consider any areas which may lead to issues with part quality, tooling manufacture, process, safety, cost, performance, weight etc.

Team Feasibility Review Meeting

This meeting would normally be held at Lotus Cars Limited to enable viewing of the latest engineering data. Attendance may include, but is not limited to:

- Supplier
- New Product Quality
- Engineering
- Supplier Quality Assurance
- Purchasing

The Team Feasibility Checklist will be used during this meeting to provide structure and agenda to the review. Where any item is found to be at risk based on the data available an action to reduce risk should be raised with ownership and date required assigned.

Actions and Follow-up

Status of actions raised from the Feasibility Review should be reported via the checklist and escalated to the LPAP Monthly Report as appropriate. All actions should be completed or risk assessed as acceptable by both parties and the checklist signed off in advance of <FA> gateway or release of production drawing, whichever occurs soonest.
6.1 Purpose

The Design FMEA (Failure Mode Effects and Analysis) is a quality tool applied during the design stage to ensure that system / vehicle functions and potential related failures are understood and appropriate countermeasures taken to prevent them occurring or reaching the end customer.

*Important Note*

Where the supplier has Design responsibility for the part(s) being supplied a Design FMEA will be required. The contents of this section apply only to parts that fall into this category.

6.2 Forms Used

A4-A-8151 Design FMEA template

*Important Note*

Lotus Cars Limited provides a template within the LPAP process for completing the Design FMEA activity. However, it is recognised that other formats exist within the industry for this quality tool and these formats may be used instead providing agreement has been given in advance by New Product Quality.
6.3 Roles and Responsibilities

Supplier

- Ensure Design FMEA is completed on time in line with these requirements
- Sign off completed Design FMEA
- Ensure all issues raised from Activity #1 Quality History Review have been fed into the Design FMEA

New Product Quality (*Lotus Internal Owner*)

- Confirm the Design FMEA is completed on time in line with these requirements
- Ensure appropriate actions are in place to address high RPN / Severity / Occurrence items
- Confirm all actions are completed and RPN’s re-scored
- Approve the Design FMEA

6.6 Activity Detail

*Writing the Design FMEA*

There are many different ways to carry out a Design FMEA. Suppliers with TS16949:2002 accreditation should conduct the activity inline with the requirements laid down within that standard. Suppliers who are not familiar with writing Design FMEA’s or require some assistance with their completion should contact New Product Quality for guidance.
Lotus Part Approval Process
Design FMEA

Design FMEA Sign Off

**Fig 6.1: Design FMEA Submission and Approval**
7.1 Purpose

The Process FMEA (Failure Mode Effects and Analysis) is a quality tool applied during the process planning stage to ensure that potential variation in manufacturing and assembly processes are controlled such that part and vehicle key functions are not effected.

A Process FMEA must be completed for all components, with the exception of Proprietary Parts, and must cover all of the manufacturing and assembly processes employed at the supplier from material delivery through to despatch of parts to Lotus Cars Limited.

7.2 Forms Used

A4-A-6148.7.1 Process FMEA template

Important Note
Lotus Cars Limited provides a template within the LPAP process for completing the Process FMEA activity. However, it is recognised that other formats exist within the industry for this quality tool and these formats may be used instead providing agreement has been given in advance by Supplier Quality Assurance.

7.3 Roles and Responsibilities

Supplier

- Ensure Process FMEA is completed on time inline with these requirements
- Sign off completed Process FMEA
- Ensure all issues raised from Activity 1 Quality History Review and Activity 5 Design FMEA have been fed into the Process FMEA
• Ensure that all key characteristics from the Drawing and Part Quality Requirements have been considered within the Process FMEA activity

Supplier Quality Assurance (Lotus Internal Owner)

• Confirm the Process FMEA is completed on time in line with these requirements
• Ensure appropriate actions are in place to address high RPN / Severity / Occurrence items
• Confirm all actions are completed and RPN’s re-scored

7.6 Activity Detail

Writing the Process FMEA

There are many different ways to carry out a Process FMEA. Suppliers with TS16949:2002 accreditation should conduct the activity inline with the requirements laid down within that standard. Suppliers who are not familiar with writing Process FMEA’s or require some assistance with their completion should contact their Supplier Quality Assurance representative for guidance.
Lotus Part Approval Process
Process FMEA

Process FMEA Sign off

Fig 7.1: Process FMEA Submission and Approval
8.1 Purpose

The Parts Quality Requirements (PQR) contains all of the functional, dimensional and cosmetic attributes of the component / assembly into one simple format which is then agreed by the supplier and Lotus Cars Limited. This document then forms the basis of all subsequent part quality assessments and data submissions for the life of the part.

8.2 Forms Used

- A4-A-6148.8.1 PQR (Part Quality Requirements)
- A4-A-6148.8.2 PQR-C (Parts Quality Requirements Change Request)

8.3 Roles and Responsibilities

Supplier

- Write PQR for parts supplied
- Sign off PQR and ensure Lotus Cars Limited approval achieved prior to supply of serial production parts

New Product Quality (*Lotus Internal Owner*)

- Sign off the PQR
- Authorise any necessary changes to the PQR
8.4 Activity Detail

The PQR is developed in conjunction with the drawing / CAD for the part and contains the following key elements:

0 Cover Page  Part details and Document revision / approval
1 Specification  Materials, Finishes, Weight etc
2 Performance  Functional requirements including testing
3 Dimensions  Part Datum’s and ongoing measurement requirements
4 Cosmetics  Visual acceptance standards including assessment method

Note: the PQR cannot be used to specify requirements outside of those contained on the production released drawing / CAD – any such changes must be requested via a “Supplier Request for Concession A4-A-6441”. Refer to the Supplier Quality Manual A5-A-6511 for more information or contact your Supplier Quality Assurance representative.
Writing of original PQR document

The supplier will normally write the PQR based upon data supplied by Lotus Cars Limited and their commodity expertise. New Product Quality will support during the writing of the PQR where required and will sign off the finished agreed document as per the process below:

**Fig 8.1: Process Flow for PQR Writing**
Requesting a change to the PQR

Either party may request a change to the approved PQR at any time due to engineering change, process capability or a revised requirement based on quality data. The following flow diagrams illustrate the change request and approval processes:

![Diagram of change request and approval process]

**Fig 8.2: Process for changes requested by Lotus Cars Limited**
**Lotus Part Approval Process**

**Part Quality Requirements**

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**Lotus**

1. **Review PQR-C**
2. **Request OK?**
   - Yes: **Sign PQR and confirm Changes OK**
   - No: **Negotiate revisions to PQR**
3. **Confirm changes and approve PQR**
4. **Copy and File PQR**

**Supplier**

1. **Raise PQR-C detailing changes**
2. **Update PQR**
3. **Sign PQR and submit for approval**
4. **File and Maintain PQR**

---

**Fig 8.3: Process for changes requested by Supplier**
9.1 Purpose

The Tooling and Facilities activity is designed to ensure that all appropriate equipment required to manufacture the parts are identified, well designed, have process capability and can produce parts that meet the requirements of Lotus Cars Limited.

9.2 Forms Used

A4-A-6148.9.1 Tooling and Facilities Buy Off

9.3 Roles and Responsibilities

Supplier

- Submit a Tooling and Facilities Buy Off for approval at the following key stages:
  1. Prior to Tooling Manufacture
  2. Prior to Tooling Release from Toolmaker
  3. After first Tooling trial at supplier’s manufacturing site

Supplier Quality Assurance (Lotus Internal Owner)

- Visit the supplier to confirm all tooling and facilities are in place and sign off the Tooling and Facilities Buy Off documentation as appropriate.

9.4 Activity Detail

This activity should be applied on all bespoke facilities, tools and gauges used in the manufacture of parts and assemblies.
Planning Phase
As part of the LPAP planning phase the LPAP Activity Plan (A4-A-6148.3.1) should have high level tooling design, manufacture and trial added within the Tooling and Facilities section. This plan is then submitted and agreed with Supplier Quality Assurance in advance of tool design / manufacture.

Design Phase
The Tooling concept / Design should be reviewed and agreed with Supplier Quality Assurance as part of the planning phase. This will authorise the manufacture of the tooling.

Manufacturing Phase
After the tooling is manufactured a review should be held at the Toolmaker to confirm tooling design and accuracy. Supplier Quality Assurance will attend this review, where agreed during the planning phase, to sign off the tooling and authorise shipment to the supplier’s manufacturing site.

First Off Tool Run at Supplier’s Site
Tooling is assessed to ensure parts made have sufficient accuracy and there are no significant tooling / process issues that will impact on Start of Production (SOP). Supplier Quality Assurance will attend where necessary to view the tooling run and assess the parts made.

Run@Rate
Final approval for tooling and facilities will be given when parts are made off the tooling, to normal manufacturing process and there are no significant issues that will affect delivery or quality for Start of Production (SOP). Supplier Quality Assurance will attend this event as part of the Run@Rate sign off and judge tooling / facilities in terms of part quality and capacity.
Lotus Part Approval Process
Tooling and Facilities

Fig 9.1: Process Flow for Tooling and Facilities Approval
10.1 Purpose

The Process Control Chart (PCC) defines the supplier’s quality control process used for confirming part attributes from the Part Quality Requirements (PQR).

10.2 Forms Used

A4-A-6148.10.1 Process Control Chart

10.3 Roles and Responsibilities

Supplier

- The Supplier must submit a copy of the PCC for approval prior to the PP build
- PCC must be approved prior to manufacture and shipment of serial production material
- After approval of the PCC the Supplier is responsible for keeping the document live and up-to-date in relation to their manufacturing process and ensuring that all changes are communicated to Supplier Quality Assurance for approval prior to implementation
- Lotus Cars Limited reserves the right to request a copy of the latest PCC, check its implementation at the supplier and request changes whenever necessary

Supplier Quality Assurance (Lotus Internal Owner)

- Request PCC from Supplier and sign-off in a timely manner
- Visit supplier and walk the process to conform implementation of PCC
- Ensure all PCC activities are completed for new product introductions in line with this procedure to support project plan requirements
10.4 Activity Detail

The Process Control Chart (PCC) is the master document for the part quality control process and must contain all part attributes shown on the Part Quality Requirements (PQR) and how these are assessed at relevant stages within the manufacturing process. It should contain sufficient detail on these quality checks including how they are done, who does them and how often the check is conducted. Any parts found to be non-conforming must also have a suitable reaction plan to ensure no defective parts can be shipped into Lotus Cars Limited.

Format for Process Control Chart

The PCC should be produced using the LPAP template (A4-A-6148.10.1) provided. Where an alternative format is in current use at the supplier this may be deemed acceptable providing:

- It contains all of the contents and information of the Process Control Chart
- Approval has been given in advance to use this format by Supplier Quality Assurance

Writing the Process Control Chart

The Process Control Chart is split into three main sections:

1. Facility Layout / Process Diagram
   This should be a pictorial representation of the manufacturing process including
   - Key Process / Facilities
   - Operators
   - Material Storage and Movements

2. Revision Record
   Complete record of the change history of the Process Control Chart including approvals
3. Process Control Chart

This is the detail of the manufacturing process aligned with the Parts Quality Requirements which shows the full quality assurance control process for the supplier’s facility.

The main PCC section itself is divided into four key areas:

1. Manufacturing Process

This is the full process shown step by step and includes any reference to bespoke tools and facilities which are owned by Lotus Cars Limited as appropriate

2. Part / Process Requirements

These are the items to be controlled. As a minimum all check items from the Part Quality Requirements should be included within the PCC against the appropriate process steps. Additional in-process check items may be added for part built assemblies or process characteristics that must be controlled to ensure a successful output from the process. Numbering of Part control items should be as per the PQR for quick cross-reference purposes.

3. Quality Control Process

Details the method of ensuring the part / process is within specification and includes who is doing the check / where and with what equipment.

4. Reaction Plan

This is the correction action that will be taken where the quality control process identifies defective parts or process out of control to ensure that only good parts can be shipped to Lotus Cars Limited. The reaction plan should make reference to how non-conforming products are controlled and demonstrate a management escalation as appropriate within the supplier’s factory.
PCC Submission and Approval

The flow below shows the writing, submission and approval process for the Process Control Chart:

Fig 10.1: Process Control Chart Submission and Approval
11.1 Purpose

Ensure that all operators and support staff involved in the manufacture and supply of components have the necessary skills and awareness of the Part Quality Requirements (PQR) to consistently make parts that meet the needs of Lotus Cars Limited.

11.2 Forms Used

A4-A-6148.11.1 Training Matrix

11.3 Roles and Responsibilities

Supplier

- Prepare the Training Matrix and record staff training status
- Ensure that all staff members are trained to the required level prior to manufacture of serial production parts
- Make sure that new staff are added to the matrix and trained accordingly as required

Supplier Quality Assurance (Lotus Internal Owner)

- Support training with respect to the clarification of the Part Quality Requirement (PQR) as required by the Supplier
- Check at the supplier site to confirm the training matrix is completed

11.6 Activity Detail
A Training Matrix is required for all operators and support staff involved in the manufacture and checking of parts. This record is to be kept up to date during the development, launch and production phases to show that personnel have had the necessary training on all tools, equipment and facilities as necessary and are trained in the quality standards documented within the Part Quality Requirement (PQR).

The Training Matrix form is supplied to use but if another format is in use at the supplier this will be acceptable provided it meets the following criteria:

- Shows Supplier / Project information including Supplier Name, Project, Part Number and Part Description
- Shows the following training information
  - Staff Name
  - Process step / Product Check / Specific Tooling or Equipment
  - Training requirement by individual and requirement
  - Training Status by individual and requirement
12.1 Purpose

To design and manufacture a fixture or gauge that is capable of measuring / confirming the key features of the parts as specified within the Part Quality Requirements (PQR). This activity applies to all bespoke gauges / fixtures used to check parts in accordance with the Part Quality Requirements (PQR).

12.2 Forms Used

A4-A-6148.12.1 Checking Fixture Approval Request
A4-A-6148.12.2 Checking Fixture Change Request

12.3 Roles and Responsibilities

Supplier

- Submit the Checking Fixture Approval Request and gain approval for concept prior to manufacture of bespoke gauges / checking fixtures
- Submit Checking Fixture Change Request and gain approval prior to making modifications to the bespoke gauges / checking fixtures

Supplier Quality Assurance (Lotus Internal Owner)

- Approve the checking fixture concept prior to manufacture
- Sign off the Checking Fixture as fit for purpose at the Run at Rate trial
- Approve any changes to the checking fixture
Lotus Part Approval Process
Checking Fixtures

12.6 Activity Detail

**Fig 12.1: Checking Fixture Final Approval**
13.1 Purpose

To provide data and information for pre-production and un-approved parts in line with the Part Quality Requirements (PQR).

13.4 Forms Used

A4-A-6148.13.1 Part Submission Sheet
A4-A-6148.13.2 Part Submission Problem Follow Sheet

13.5 Roles and Responsibilities

Supplier
- Send Part Submission Sheets for all pre-production / un-approved parts
- Ensure all items agreed on the Part Quality Requirements (PQR) are checked with measured results recorded on the Part Submission Sheets
- Ensure where parts are away from Part Quality Requirements (PQR) requirements a Part Submission Problem Follow Sheet is attached detailing actions in place to rectify defects for future shipments.

New Product Quality (Lotus Internal Owner)
- Agree Part Submission Sheet requirements by build phase and ensure

13.6 Activity Detail

Part Submission Sheets are required for all parts sent to Lotus Cars Limited for:
- Prototype and Pre-production builds
- Confirmation of change to part, tooling or process
- Parts that do not have interim or full approval
Lotus Part Approval Process

Part Submission Sheet

Part Submission Process

Fig 13.1: Part Submission Sheet Process Flow
14.1 Purpose

Sub-supplier approvals are required to ensure that sub-assembly / child parts used within the final finished bought assembly supplied to Lotus Cars Limited are assessed and quality controlled.

14.2 Forms Used

A4-A-6148.14.1 Sub-Supplier Approval

14.3 Roles and Responsibilities

Supplier
- Ensure that where sub-supplier assemblies / components have a direct impact on the Part Quality Requirements then these items are cascaded to the sub-supplier and adequate process controls are in place within the supply chain to maintain the standards required
- Ensure that Sub-Supplier Approvals are completed prior to the Run at Rate activity

Supplier Quality Assurance (Lotus Internal Owner)
- Confirm all requirements from the PQR (Part Quality Requirements) are cascaded to sub-suppliers as necessary
- Confirm all sub-suppliers are approved with no open issues prior to final approval of finished assemblies
14.4 Activity Detail

All components, sub-assemblies and materials that form part of the finished part or assembly are subject to the requirements of this activity. Where a sub-supplier has been selected by the Tier 1 supplier they are responsible for sub-supplier approvals.

Where the sub-supplier has been selected by Lotus Cars Limited approval responsibility will be agreed during the activity planning process.

In terms of final approval for sub-supplier parts the Sub-Supplier Approval Warrant should be signed by the Sub Supplier and Tier 1 supplier to confirm the sub-assembly / component part meets all quality requirements and can be made at required volumes.
15.1 Purpose

To verify the supplier’s production processes can produce parts to the required quality at the peak scheduled rate after Start of Production.

15.2 Forms Used

A4-A-6148.15.1 Run at Rate Sign Off

15.3 Roles and Responsibilities

Supplier

- Ensure that all staff are trained and in place
- Ensure that all tools and facilities are in place
- Ensure all previous LPAP activities are completed and available to support the Run at Rate trial and sign off

Supplier Quality Assurance (Lotus Internal Owner)

- Confirm previous LPAP activities are completed prior to the Run@Rate trial
- Confirm that the supplier has all production tooling, facilities and processes in place for the trial in their final location
- Confirm that all staff are trained and training matrix available
- Confirm correct delivery packaging is in place
- Assess process capacity and output and Sign-off Run@Rate trial paperwork
15.4 Activity Detail

The Run@Rate trial is used to assess the complete manufacturing system to ensure the process can support and meet Lotus production volumes at the required quality standard. The focus should not only be on producing parts but on the complete manufacturing system.

Part packaging should also be factored into the trial, as this can impact negatively on part quality.

Items for consideration during the Run@Rate trial are as follows:

- LPAP including: Process Control Chart, Part Quality Requirements, Work Instructions and Training Matrix
- Contractual delivery packaging
- Contractual versus actual parts produced per hour
- Contractual versus actual scrap levels produced
- Rework controls – on-line or offline
- Tool change over allowance
- Machine breakdown allowance
- Maintenance allowance
- Shift changeover allowance
- Production break allowance
- Spare part lead times
Lotus Part Approval Process

Run@Rate Trial Sign Off

**Lotus**

- Review Supplier Capacity
- Capacity meets Demand?
  - Yes
  - No: Agree corrective actions with supplier
- Agree Run@Rate attendance
- Sign off Run@Rate Form

**Supplier**

- Complete Capacity plan on Run@Rate Form
  - Note: All LPAP activities 1-14 should be completed prior to Run@Rate trial
- Conduct Run@Rate trial build
- Required Qty Parts Made?
  - Yes
  - No: All Ops within Cycle Time?
    - Yes
    - No: Scrap/Yield within Target?
      - Yes
      - No: Process Obs all OK?
        - Yes
        - No
- Agree Corrective Actions and Date for next trial
- Sign off Run@Rate Form

If Lotus not in attendance at trial send form with all sections completed to Lotus for sign off

**Fig 15.1: Process Flow for Run@Rate**

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16.1 Purpose

To ensure master samples are made demonstrating that off tool/off process parts meet the appearance criteria (colour and texture) and satisfy the design intent.

16.2 Forms Used

A4-A-6024 Appearance Approval Report

16.3 Roles and Responsibilities

Supplier
- Follow all steps within the Appearance Approval process
- Provide master sample parts for Lotus sign-off and ensure approval is granted prior to manufacture of serial production material

New Product Quality (Lotus Internal Owner)
- Ensure Master Sample is made available and presented for sign off

Design
- Review and approve Master Sample as appropriate

16.6 Activity Detail

All parts that are visible to the customer during normal vehicle usage or have specific standards for colour, texture and graining on the design release must be submitted to Lotus for Appearance Approval.
Initial Appearance Approval

Prior to tooling graining / commissioning that effect final part appearance an Initial Appearance Approval is required:

- Supplier should submit colour/material plaque with the Appearance Approval for to New Product Quality
- New Product Quality will review the sample plaque with Design to confirm acceptance
- New Product Quality will communicate the outcome of the review to the supplier and co-ordinate any specific actions required

Final Appearance Approval

Prior to manufacture of serial production parts Final Appearance Approval should be achieved based upon submitted Master Sample parts. These are reviewed with Design to ensure they meet the original design intent and by New Product Quality to ensure they achieve the required customer standard. These parts should be made off production tooling and to normal production process and meet all of the requirements specified within the PQR.

- The supplier will submit “master sample” parts to New Product Quality for final appearance approval.
- Design will review the parts and sign them off to confirm acceptance
- New Product Quality will review the parts and sign them off to confirm acceptance
- New Product Quality will communicate the outcome of the review to the supplier and co-ordinate any specific actions required where approval is not achieved
17.1 Purpose

The Final Approval is granted based on submission of the “Final Part Approval” document from the supplier and successful completion of all proceeding LPAP activities.

17.2 Forms Used

A4-A-6148.17.1 Final Part Approval

17.3 Roles and Responsibilities

Supplier
- Submit a completed Final Part Approval form A4-A-6148.17.1 when all previous LPAP activities are completed
- Ensure all LPAP documentation is available for review in support of the Approval submission – these should be attached to Form A4-A-6148.17.1 for Category A suppliers

Supplier Quality Assurance (Lotus Internal Owner)
- Ensure that the Final Part Approval form is reviewed and signed off in a timely manner

New Product Quality
- Support the Final Part Approval sign off by assessing part fit and function and acceptability
17.6 Activity Detail

The Final Part Approval form must be submitted for all part approvals in line with LPAP process and is the final signed declaration from the supplier that parts meet requirements and is also the signed authority from Lotus Cars Limited that permits shipments of serial production parts.

Important Note:

*The Final Part Approval form A4-A-6148.17.1 shall be used to sign off all new / modified / process change parts to Lotus regardless of whether LPAP or an agreed alternative parts maturation process has been used.*

Approval Submission Requirements

At the start of the LPAP programme with the Supplier Quality Assurance will advise the Category rating and submission requirements for the supplier using the LPAP Activity Plan (A4-A-6148.3.1).

Final Part Approval

Once all LPAP activities have been completed the Final Part Approval form can be submitted to Lotus to allow sign off.

Lotus will then assess the LPAP documentation submitted and sample part physical appearance and vehicle fit and function. If all elements of the assessment are passed then a Full Approval will be granted.

Where some issues are found that do not directly affect part fit/function an Interim approval may be raised to allow shipment of serial production material into Lotus pending correction of open items.
Lotus Part Approval Process
Final Part Approval

Where issues found do affect part fit and function or insufficient information has been provided to make an approval Lotus will contact the supplier direct to agree corrective actions and timing to achieve Part Approval.

Fig 17.1: Process Flow for Final Part Approval
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA</td>
<td>Concept Approval</td>
<td>Formal gateway within Lotus Product Delivery System</td>
</tr>
<tr>
<td>CD</td>
<td>Concept Direction</td>
<td>Formal gateway within Lotus Product Delivery System</td>
</tr>
<tr>
<td>CI</td>
<td>Concept Initiation</td>
<td>Formal gateway within Lotus Product Delivery System</td>
</tr>
<tr>
<td>ELV / RRR</td>
<td>End of Live / Re-use Recycle Recover</td>
<td>Material / Chemical data for all component parts used within Lotus products that is required for vehicle type approval</td>
</tr>
<tr>
<td>FA</td>
<td>Final Approval</td>
<td>Formal gateway within Lotus Product Delivery System</td>
</tr>
<tr>
<td>FMEA</td>
<td>Failure Mode Effect Analysis</td>
<td>Quality tool used to predict and prevent product failures during the design and process stages</td>
</tr>
<tr>
<td>LA</td>
<td>Launch Approval</td>
<td>Formal gateway within Lotus Product Delivery System</td>
</tr>
<tr>
<td>NPQ</td>
<td>New Product Quality</td>
<td>Department within Lotus Cars responsible for part and vehicle maturation for new models</td>
</tr>
<tr>
<td>PA</td>
<td>Production Approval</td>
<td>Formal gateway within Lotus Product Delivery System</td>
</tr>
<tr>
<td>PP</td>
<td>Production Proveout</td>
<td>Final Pre-production vehicles built prior to SOP to validate off process parts and production facility can deliver vehicles to target</td>
</tr>
<tr>
<td>Acronym</td>
<td>Definition</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>PPA</td>
<td>Pre-Production Approval</td>
<td>Formal gateway within Lotus Product Delivery System</td>
</tr>
<tr>
<td>PS</td>
<td>Project Start</td>
<td>Formal start of a new project within Lotus Product Delivery System</td>
</tr>
<tr>
<td>SOP</td>
<td>Start of Production</td>
<td>Formal gateway within Lotus Product Delivery System</td>
</tr>
<tr>
<td>SQA</td>
<td>Supplier Quality Assurance</td>
<td>Department at Lotus responsible for managing supplier performance. Part of Quality Department</td>
</tr>
<tr>
<td>TT</td>
<td>Tooling Tryout</td>
<td>Initial Pre-production vehicle build to confirm off tool parts and production facility can deliver vehicles to target</td>
</tr>
<tr>
<td>VP</td>
<td>Validation Prototype</td>
<td>Prototype vehicle built to confirm that part and vehicle design can meet attributes and targets</td>
</tr>
</tbody>
</table>